

GRADE 5 STANDARDS AND LEARNING ACTIVITIES

Strand: Number Sense and Operations**NUMBER SENSE**

5.NSO-N.1. Estimate, round, and manipulate very large (e.g., billions) and very small (e.g., thousandths) numbers; demonstrate an understanding of place value to billions and thousandths.

5.NSO-N.2. Represent and compare very large (billions) and very small (thousandths) positive numbers in various forms, such as expanded notation without exponents e.g., $9,724 = (9 \times 1,000) + (7 \times 100) + (2 \times 10) + 4$.

5.NSO-N.3. Find and position integers, fractions, mixed numbers, and decimals (both positive and negative) on the number line.

Example: Arrange in order $9/4$, 35%, 0.3, -3, $2\frac{1}{2}$ on a number line.

5.NSO-N.4. Compare and order integers (including negative integers) and positive fractions, mixed numbers, decimals, and percents.

Example: Find the positions on a number line of 3.56, $3/4$, -2.5, $1\frac{5}{6}$, 50% and -4.

5.NSO-N.5. Apply the number theory concepts of common factor, common multiple, and divisibility rules for 2, 3, 5, and 10 to the solution of problems. Demonstrate an understanding of the concepts of prime and composite numbers.

5.NSO-N.6. Know the set of prime numbers to 100.

Example: Which of the following numbers are prime: 2, 3, 7, 12, 17, 18? Justify your choices.

5.NSO-N.7. Determine the prime factors of all numbers through 100, and write the numbers as the product of their prime factors by using exponents to show multiples of a factor (e.g., $24 = 2 \times 2 \times 2 \times 3 = 2^3 \times 3$).

Example: Create a prime factor book for all numbers through 100 using factor trees. The prime factors use exponents to illustrate multiples of a factor.

$$\begin{array}{c}
 & & 12 \\
 & \swarrow & \\
 4 \times 3 & & \\
 \swarrow \quad \searrow & & | \\
 2 \times 2 \times 3 & = & 2^2 \times 3
 \end{array}$$

Strand: Number Sense and Operations (continued)**FRACTIONS**

5.NSO-F.8. Explain different interpretations of fractions as a ratio of whole numbers, as parts of unit wholes, as parts of a collection, as division of whole numbers by whole numbers, and as locations on the number line.

Example: First, $\frac{2}{3}$ means "2 divided by 3" and is located between 0 and 1 on the number line. A car moving at a constant speed travels 130 miles in 2 hours. Write the ratio of distance to time and use it to find how far the car will travel in 5 hours.

5.NSO-F.9. Interpret percents as parts out of 100, use % notation, and express a part of a whole as a percentage.

Example: Shade a 100-square grid to show 25%. What fraction is this?

5.NSO-F.10. Identify and determine common equivalent fractions, mixed numbers (with denominators 2, 4, 5, and 10), decimals, and percents, and explain why they represent the same value.

Examples: Explain why $\frac{1}{2} = 0.5 = 50\%$; $\frac{2}{5} = 0.4 = 40\%$.

5.NSO-F.11. Write improper fractions as mixed numbers, and know that a mixed number represents the number of "wholes" and the part of a whole remaining.

Example: Write $\frac{5}{4}$ as a mixed number; $1\frac{1}{4}$ means "1 plus $\frac{1}{4}$ ".

COMPUTATION AND OPERATIONS

5.NSO-C.12. Add with negative integers, subtract positive integers from negative integers, and verify the reasonableness of the results.

Example: $-8 + -5 = ?$; $-9 - 5 = ?$

5.NSO-C.13. Add and subtract fractions (including mixed numbers) with like and unlike denominators (of 2, 3, 4, 5, 6 and 10), and express answers in the simplest form.

Example: $3\frac{4}{5} - 2\frac{2}{3} = ?$

5.NSO-C.14. Add and subtract positive decimals.

Example: Compute $39.46 - 20.89$ and check the answer by estimating.

5.NSO-C.15. Solve problems involving multiplication and division of any whole number.

5.NSO-C.16. Demonstrate proficiency with division, including division with positive decimals and long division with multidigit divisors.

5.NSO-C.17. Show an understanding of multiplication and division of fractions; multiply positive fractions with whole numbers.

Example: Explain why $\frac{5}{8} \div \frac{15}{16} = \frac{5}{8} \times \frac{16}{15} = \frac{2}{3}$.

Strand: Number Sense and Operations (continued)

COMPUTATION AND OPERATIONS (CONTINUED)

5.NSO-C.18. Simplify fractions in cases when both the numerator and the denominator have 2, 3, 4, 5, or 10 as a common factor. Show that two fractions are or are not equivalent by reducing to simpler forms or by finding a common denominator.

Example: Show how $10/15 = 14/21$.

5.NSO-C.19. Multiply positive decimals with whole numbers.

Example: $3.265 \times 9 = ?$

5.NSO-C.20. Demonstrate an understanding of and compute (positive integer) powers of 10 (e.g., 10^2 , 10^2); compute examples as repeated multiplication.

5.NSO-C.21. Know integer subtraction is the inverse of integer addition; use the number line to model addition and subtraction of integers and add and subtract integers, with the exception of subtracting negative integers.

5.NSO-C.22. Demonstrate an understanding of how parentheses affect expressions involving addition, subtraction, and multiplication, and use that understanding to solve problems.

Example: Solve $3 \times (4 + 2) = ?$

ESTIMATION

5.NSO-E.23. Estimate sums and differences of whole numbers, positive fractions, and positive decimals. Estimate products of whole numbers and products of positive decimals with whole numbers. Use a variety of strategies and judge reasonableness of answers

Example: A box of 6 ice cream bars weighs 10.65 oz. Approximately what is the net weight of 49 boxes?

Strand: Patterns, Relations, and Algebra

5.PRA.1. Analyze and determine the rules for extending symbolic, arithmetic, and geometric patterns and progressions (e.g., ABBCCC ...; 1, 5, 9, 13, ...; 3, 9, 27, ...).

Example: Triangles and trapezoids were used to make a pattern.



1. If the pattern above continues, how many black triangles are needed to build level 10?

2. If the pattern above continues, how many white trapezoids are needed to build level 10?

Explain how you know you are correct.

Strand: Patterns, Relations, and Algebra

5.PRA.2. Replace variables with given values, evaluate, and simplify.

Example: Refers to standards 6.P.2, 6.P.3, and 6.P.5.

$$\begin{array}{lcl} \star + \square = 10 & \square = ___ \\ \star + \square + \square = 16 & \star = ___ \\ \star + \square + \triangle + \triangle = 26 & \triangle = ___ \end{array}$$

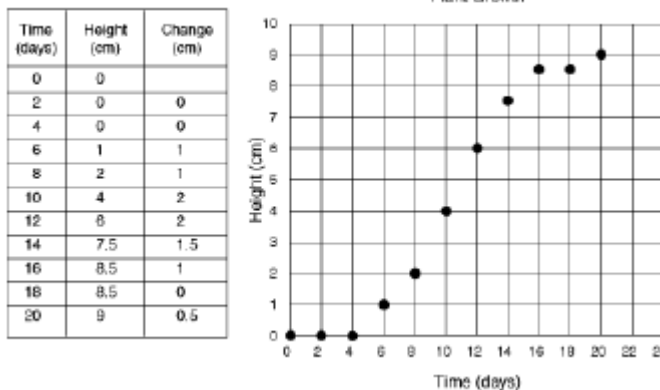
Explain your solution strategy.

5.PRA.3. Use the properties of equality to solve problems with whole numbers.

Example: If $\square + 7 = 13$, then $\square = 13 - 7$, therefore $\square = 6$; if $3 \times \square = 15$, then $1/3 \times 3 \times \square = 1/3 \times 15$, therefore $\square = 5$.

5.PRA.4. Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols (e.g., input-output tables).

Example: Based on the data in the table, create a graph that shows the plant's growth over time.



5.PRA.5. Interpret and evaluate mathematical expressions that use parentheses; use parentheses to indicate which operation to perform first when writing expressions containing more than two terms and different operations.

Example: Find the values of $10 - (7 - 3)$ and of $(10 - 7) - 3$. Write in symbols: add 19 and 34 and double the result.

5.PRA.6. Solve problems involving proportional relationships using concrete models, tables, graphs, and paper-pencil methods.

Example: An official U.S. flag uses 19 to 10 as a ratio of length to width. Create a table to illustrate five flag sizes that could be used.

5.PRA.7. Interpret graphs that represent the relationship between two variables in everyday situations.

Example: The speed (v feet per second) of a car t seconds after it starts is given by the formula $v = 12t$. Find the car's speed after 5 seconds.

Strand: Geometry

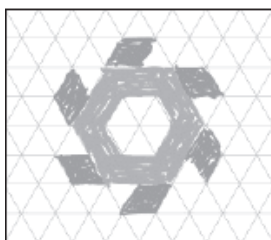
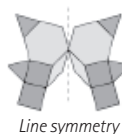
5.G.1. Identify polygons based on their properties, including types of interior angles, perpendicular or parallel sides, and congruence of sides (e.g., squares, rectangles, rhombuses, parallelograms, and trapezoids; isosceles, equilateral, and right triangles).

5.G.2. Identify, describe, and compare special types of three-dimensional shapes (e.g., cubes, prisms, spheres, cones, and pyramids) based on their properties, such as edges and faces.

5.G.3. Identify relationships among points, lines, and planes (e.g., intersecting, parallel, perpendicular).

5.G.4. Identify and describe types of symmetry, including line and rotational.

Example: The first two figures show two basic types of symmetry: rotational symmetry and line symmetry.



What kind(s) of symmetry(s) exist in the third figure?

5.G.5. Determine if two triangles or two quadrilaterals are congruent by measuring sides or a combination of sides and angles.

Example: In a collection of triangles, pick out those that are the same shape and size and explain your decisions.

5.G.6. Predict, describe, and perform transformations on two-dimensional shapes (e.g., translations, rotations, and reflections).

Example: Draw a square and then slide it 3 inches horizontally across your page. Draw the new square in a different color.

5.G.7. Graph points and identify coordinates of points on the Cartesian coordinate plane in the first two quadrants.

Example: For $x = 1, 2, 3,$ and $4,$ find points that fit the equation $y = 2x + 1$. Plot those points on graph paper and join them with a straight line.

Strand: Measurement

5.M.1. Apply the concepts of perimeter and area to the solution of problems involving triangles and rectangles. Apply formulas where appropriate.

Example: Find the area and perimeter of a triangle with base 4 m and height 5 m.

5.M.2. Apply formulas for the areas of triangles, rectangles, and parallelograms; recognize that shapes with the same number of sides but different appearances can have the same area.

Example: A square room of length 17 feet has a tiled fireplace area that is 6 feet long and 4 feet wide. You want to carpet the floor of the room, except the fireplace area. Find the area to be carpeted.

5.M.3. Solve problems involving proportional relationships and units of measurement.

Example: Sam made 8 out of 24 free throws. Use a proportion to show how many free throws Sam would probably make out of 60 attempts.

5.M.4. Identify, measure, and describe circles and the relationships of the radius, diameter, circumference, and area (e.g., $d = 2r$), and use these concepts to solve problems.

Examples: On a circle, draw a radius and a diameter and describe the differences and similarities between the two. Describe the relationship between the circumference of a circle and the diameter.

5.M.5. Find volumes and surface areas of rectangular prisms.

Example: Storage boxes are cube shaped and measure 4 inches on an edge. How many of these storage boxes are needed for 300 small cubes, 2 inches on an edge?

5.M.6. Know that angles on a straight line add up to 180° , interior angles of a triangle add up to 180° , angles surrounding a point add up to 360° , and interior angles of a quadrilateral add up to 360° ; use these properties to solve problems.

Example: Find the size of the third angle of a triangle with angles of 73° and 49° .

5.M.7. Identify, measure, describe, classify, and draw various angles and triangles, given sides and the angle between them or given two angles and the side between them.

Example: Draw a triangle with one right angle and two sides congruent.

Strand: Data Analysis, Statistics, and Probability

5.DASP.1. Define and apply the concepts of mean to solve problems.

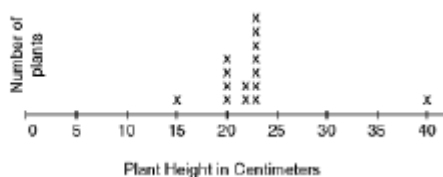
Example: So far this term, Heidi has these scores on quizzes: 87, 86, 96, 87. What is the lowest score she can get on the one remaining quiz to have a final average (mean) score of 90?

- A. 94
- B. 97
- C. 90
- D. 91

5.DASP.2. Construct, draw conclusions, and make predictions from various representations of data sets, including tables, line graphs, line plots, circle graphs, and bar graphs (where symbols or scales represent multiple units).

Example: Create the line plot that corresponds to the information in the following tally chart.

Plant Height Data	
Height (in cm)	Number of Plants
15	
20	
22	
23	
40	



5.DASP.3. Predict the probability of outcomes of simple experiments and test the predictions.

Example: Jenna has a bag of saltwater taffy of which 8 are lemon, 6 are peppermint, and 10 are licorice. She offers the bag to Antonia, who takes one piece of taffy without looking. What are the chances that it is peppermint?